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A distorted radio shell in the young supernova SN 1986J[$M.A.\ Pérez{-}Torres et al.$]$M.A.\ Pérez-Torres$,[1]
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abstract We report here on 5 GHz global very-long-baseline interferometry (VLBI) observations of SN 1986J, 16$yr after its explosion. We obtained a high-resolution image of the supernova, which shows a distorted shell of radio e$
4.7 mas, corresponding to a linear size of $\sim 6.8 \times 10^{17}$ cm for a distance of 9.6 Mpc to NGC 891. The average speed of the shell has decreased from ∼7600 kms^{-1} in 1988.74 $down to about$ 6300 km s^{-1} in 1999.14, indicative of a mild deceleration in the expansion of SN 1986J. $Assuming a standard density profile for the progenitor wind$($\rho_{\rm cs} \propto$
$r^{-s}, s = 2$), the swept-up mass by the shock front is ∼2.2 M$_\odot$. This large swept-up mass, coupled with the mild deceleration suffered by the supernova, suggests that the mass of the hydrogen-rich envelope ejected at explosion was 12 $M_\odot$. Thus, the supernova progenitor must have kept intact most of its hydrogen-rich envelope by the time of explosion, which favours a single, massive star progenitor scenario. We find a flux density for SN 1986J of ∼7.2 mJy at the observing frequency of 5 GHz, which results in a radio luminosity of $\sim 1.4 \times 10^{37}$ erg s^{-1} for the frequency range 10^7–10^{10} Hz ($\alpha = -0.69; S_\nu \propto \nu^\alpha$). We detect four bright knots that delineate the shell structure, and an absolute minimum of emission, which we tentatively identify with the centre of the supernova explosion. If this is the case, SN 1986J $has then suffered an asymmetric expansion, which could be due to an asy$